WORK PLAN
(ADDENDUM NO. 2)
FOR GROUNDWATER MONITORING

Port of Portland
Marine Terminal 1 South
2100 NW Front Avenue
Portland, Oregon

August 1, 2001

Prepared for:

The Port of Portland
Portland, Oregon

Prepared by:

Hahn and Associates, Inc.
Portland, Oregon

HAI Project No. 5106
DEQ ECSI File No. 2642

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A Oregon Department of Environmental Quality Letter Dated July 26, 2001

HAHN AND ASSOCIATES, INC.
ENVIRONMENTAL CONSULTANTS

August 1, 2001

Mr. Joe Mollusky
The Port of Portland
P.O. Box 3529
Portland, Oregon 97208

HAI Project No. 5106
ODEQ ECSI File No. 2042

Subject: Work Plan (Addendum No. 2) for Groundwater Monitoring, Marine Terminal 1 South, 2100 NW Front Avenue, Portland, Oregon

Dear Mr. Mollusky:

INTRODUCTION

Hahn and Associates, Inc. (HAI) has prepared this Groundwater Monitoring Work Plan (Addendum No. 2) to the Work Plan for Supplemental Site Characterization[1] dated August 31, 2000, for the above-referenced site (Figures 1 and 2). The addendum was prepared in response to the July 26, 2001, Oregon Department of Environmental Quality (DEQ) letter (Appendix A) to the Port of Portland (Rod Struck to Joe Mollusky) regarding the Remedial Investigation (RI) report[2]. This Work Plan Addendum (No. 2) was designed to address DEQ's request for further characterization of hydrogeologic conditions, establishment of a monitoring well network, and collection of monitoring well groundwater quality samples at the site (DEQ letter General Comment B and Specific Comments 5, 6, and 7). A response to the remaining DEQ comments will be prepared that will identify comments to be addressed in the Risk Assessment (RA) and those that will be addressed in other deliverables.

OBJECTIVES

The objectives of the proposed work activities in Addendum No. 2 are to:

- Establish a monitoring well network in key areas at the site.
- Gather additional data to:
  1) Validate push probe boring groundwater data
  2) Monitor water quality
  3) Determine groundwater flow directions at the site
  4) Evaluate the groundwater to surface water pathway at the site
  5) Support the site Risk Assessment (RA).

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[1] Hahn and Associates, Inc. (2000). *Work Plan for Supplemental Site Characterization, Marine Terminal 1 South, 2100 NW Front Avenue, Portland, Oregon.* August 31, 2000.

[2] Hahn and Associates, Inc. (2001). Terminal 1 South Remedial Investigation Report, *Port of Portland Marine Terminal 1 South, 2100 NW Front Avenue, Portland, Oregon. July 12, 2001.*

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3. GROUNDWATER CHARACTERIZATION PLAN

Addendum No. 2 addresses the additional groundwater characterization through the installation of a groundwater monitoring well network, as per Section 3.4.2 of the Work Plan for Supplemental Site Characterization (HAI 2000). The amended groundwater characterization plan includes the following general components:

1) Monitoring well network installation

2) Water level monitoring

3) Groundwater quality monitoring

4) Monitoring well elevation survey

5) Investigative-derived waste (IDW) management

6) Report preparation

3.1 Monitoring Well Network Installation

3.1.1 Monitoring Well Locations

A monitoring well network consisting of seven (7) shallow monitoring wells is proposed for installation at the site (Figures 3 and 4). The proposed monitoring wells have been located based on the following criteria:

1) Within and down-gradient of areas of primary groundwater impact, specifically the B-37 (dry well) and B-38 Areas

2) At locations suitable to assess the validity of push probe groundwater samples

3) At locations suitable for evaluation of the groundwater to surface water pathway; i.e. along the riverfront

4) Outside the footprints of proposed building locations, wherever practicable, based on the most-recent site re-development plan for the property.

Seven monitoring wells (MW-1 through MW-7) are proposed for the site. Three monitoring wells (MW-1, MW-2, and MW-3) will be installed in the B-38 Area, two monitoring wells (MW-4 and MW-5) will be installed in the B-37 (dry well) area, and two monitoring wells (MW-6 and MW-7) will be installed in the eastern portion of the site.

MW-1, MW-2, and MW-4 will be placed at locations that are in or immediately down-gradient of primary groundwater impact areas to monitor groundwater quality and assess plume stability. Down-gradient monitoring wells MW-3, MW-5, and MW-7 will be placed within approximately 75 feet of the Willamette River bank to provide groundwater quality down-gradient of known sources and to evaluate the groundwater to surface water pathway. MW-6 will be placed in an up-gradient area to determine background groundwater quality at the site and provide additional hydraulic control.

The locations of MW-1, MW-2, MW-4, MW-6, and MW-7 will further be used to evaluate the validity of push probe groundwater sample results.

3.1.2 Monitoring Well Construction

Remedial Investigation activities conducted at the Terminal 1 South site indicate that groundwater occurs at an average depth of 23 feet below ground surface (bgs), but may be as deep as 29 feet bgs. Accordingly, monitoring wells are proposed for installation to a depth of 32 feet bgs with a 10-foot screen interval to ensure adequate groundwater for sampling purposes. An example schematic monitoring well construction diagram is depicted in Figure 5. Monitoring well construction, surface completion, and development will follow procedures outlined in Sections 2.4 and 2.5 of the Sampling Analysis Plan (SAP)(Appendix A of the Work Plan).

3.2 Water Level Monitoring

Water level monitoring will be conducted at the monitoring wells on a monthly basis for a period of six months in an effort to establish the groundwater flow beneath the site. In addition, Willamette River stage data at the Morrison Bridge will be monitored via the United States Geological Survey website to assess the relationship between site groundwater and river stage. The results of the monthly water level monitoring will be included in progress reports prepared for the site (Section 3.6).

3.3 Groundwater Quality Monitoring

Following installation of the monitoring wells, at least two events of groundwater monitoring will be conducted at the site. During the first event, groundwater samples will be analyzed for the presence of polynuclear aromatic hydrocarbons (PAHs), bis(2-ethylhexyl)phthalate (DEHP), and total (unfiltered) and dissolved (filtered) metals (arsenic, copper, and lead) as per U. S. Environmental Protection Agency (EPA) Methods detailed in Section 2.7 of the SAP. In addition, all monitoring wells will be analyzed for total suspended solids (TSS) by EPA Method 160.1.

Based on the first monitoring event results, a determination will be made as to the need for continued monitoring of all constituents of potential concern (COPCs). Following the second monitoring event, the need for further groundwater monitoring at the site will be evaluated in consultation with the DEQ. All monitoring well sampling and quality assurance and quality control (QA/QC) will follow Sections 4.0 and 7.0 of the SAP.

3.4 Monitoring Well Elevation Survey

All monitoring wells will be surveyed for relative location and elevation by a Port of Portland surveyor. For monitoring wells, both the ground surface and the top of the casing elevations will be surveyed. All survey data will be collected within an accuracy of 0.01 feet vertically and 0.1 feet horizontally. Relevant physical features will also be surveyed in order to compile an accurate map of the study area. However, legal property boundaries will not be surveyed.

3.5 Investigative-Derived Waste (IDW) Management

Investigative derived waste (IDW) will be managed in a manner that is consistent with the U.S. Environmental Protection Agency (EPA) *Guide to Management of Investigation Derived-Wastes* dated January 1992 as detailed in Section 6.0 of the SAP.

3.6 Report Deliverables

Following completion of the monitoring well installation and the first round of groundwater sampling, a progress report will be prepared summarizing the monitoring well installation and sampling, and the results of the first groundwater monitoring event. The first progress report will include monitoring well logs. The second monitoring event will be documented in a second progress report at which time the need for further monitoring and reporting will be evaluated in consultation with the DEQ.

Upon your review, please contact the undersigned with your comments or questions.

Sincerely,

Guy H. Tanz, R.G.
Associate

TABLE 1
Groundwater Monitoring Plan

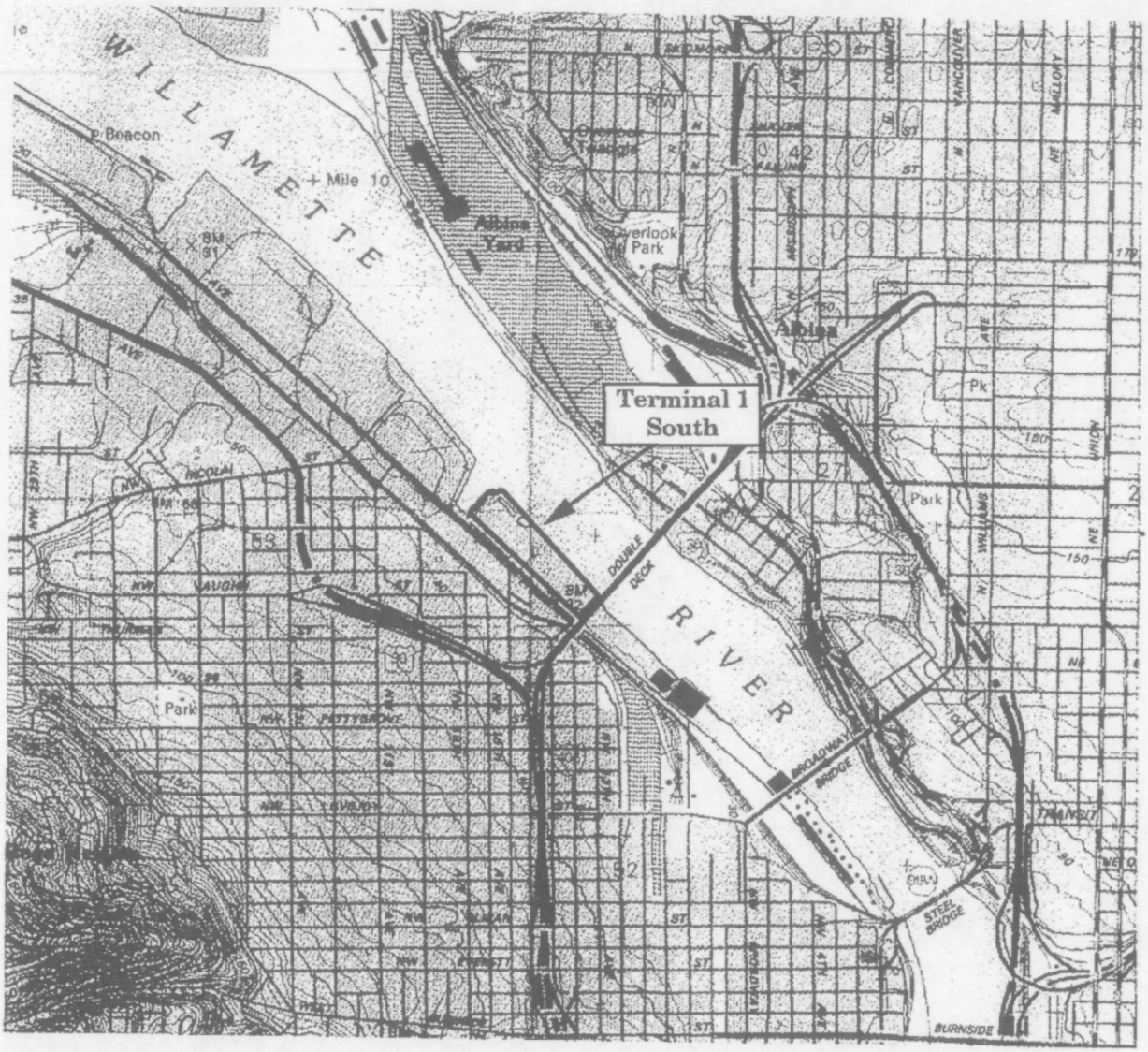
Work Plan (Addendum No. 2) for Groundwater Monitoring
Marine Terminal 1 South
2100 NW Front Avenue
Portland, Oregon

HAI Project No. 5106

Event ==>	1st					2nd				
EPA Method ==>	8270 SIM	8270	6010		160.1	8270 SIM	8270	6010		160.1
Analyte ==>	PAHs	DEHP	Unfiltered Metals[1]	Filtered Metals[1]	TSS	PAHs	DEHP	Unfiltered Metals[1]	Filtered Metals[1]	TSS
MW-1	X	X	X	X	X	X	TBD	X	X	X
MW-2	X	X	X	X	X	X	TBD	X	X	X
MW-3	X	-	X	X	X	X	-	X	X	X
MW-4	X	-	X	X	X	X	-	X	X	X
MW-5	X	-	X	X	X	X	-	X	X	X
MW-6	X	X	X	X	X	TBD	TBD	TBD	TBD	TBD
MW-7	X	X	X	X	X	TBD	TBD	TBD	TBD	TBD
Duplicate	X	X	X	X	X	X	TBD	X	X	X
Equipment Blank	-	X	-	-	-	-	TBD	-	-	-
Total Possible Samples ==>	8	6	8	11	11	11	6	11	11	11

NOTE:
1 = arsenic, copper, and lead
X = Collect and analyze for indicated analyte
DEHP = bis(2-ethylhexyl)phthalate
EPA = U. S. Environmental Protection Agency
PAHs = polynuclear aromatic hydrocarbons
TBD = to be determined
TSS = total suspended solids

Updated: 8/1/01 GHT
File: 5106 Tbl-01 GWMon Plan



Note: Base Map from the Portland, Oregon USGS 7.5-Minute Quadrangle, 1990
Contour Interval: 10 Feet

HAI Project No. 5106	**HAHN AND ASSOCIATES** INCORPORATED	**Location Map**	**FIGURE**
August 2001	ENVIRONMENTAL MANAGEMENT 434 NW SIXTH AVENUE, SUITE 203 PORTLAND, OREGON 97209 503/796-0717	Work Plan Addendum No. 2 Marine Terminal 1 South 2100 NW Front Avenue Portland, Oregon	1

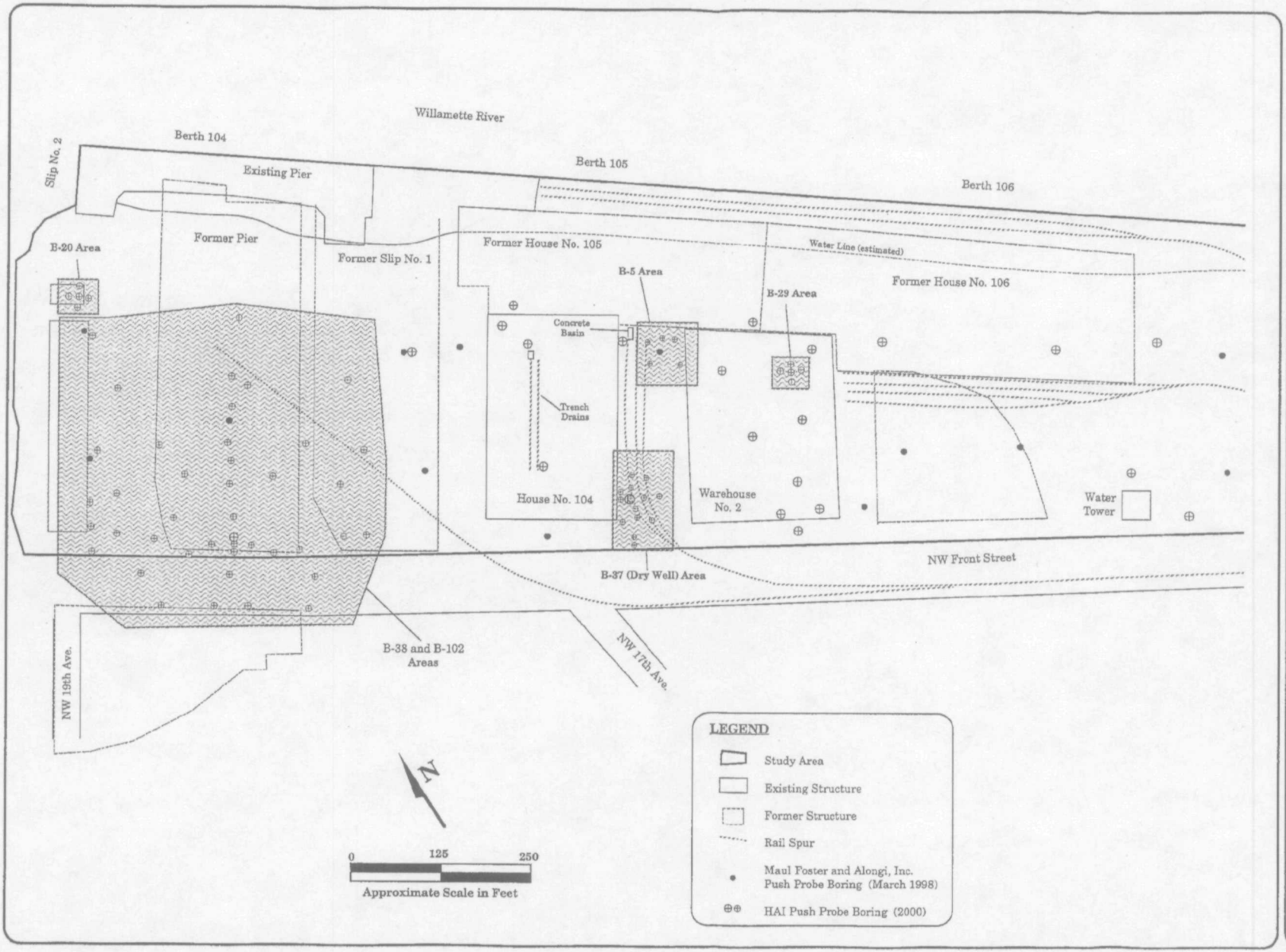


Figure 2

Site Map

Work Plan Addendum No. 2
Marine Terminal 1 South
2100 NW Front Avenue
Portland, Oregon

HAHN AND ASSOCIATES, INC.
ENVIRONMENTAL MANAGEMENT
434 NW SIXTH AVENUE, SUITE 203
PORTLAND, OREGON 97209
(503) 796-0717

August 2001

HAI Project No. 5106

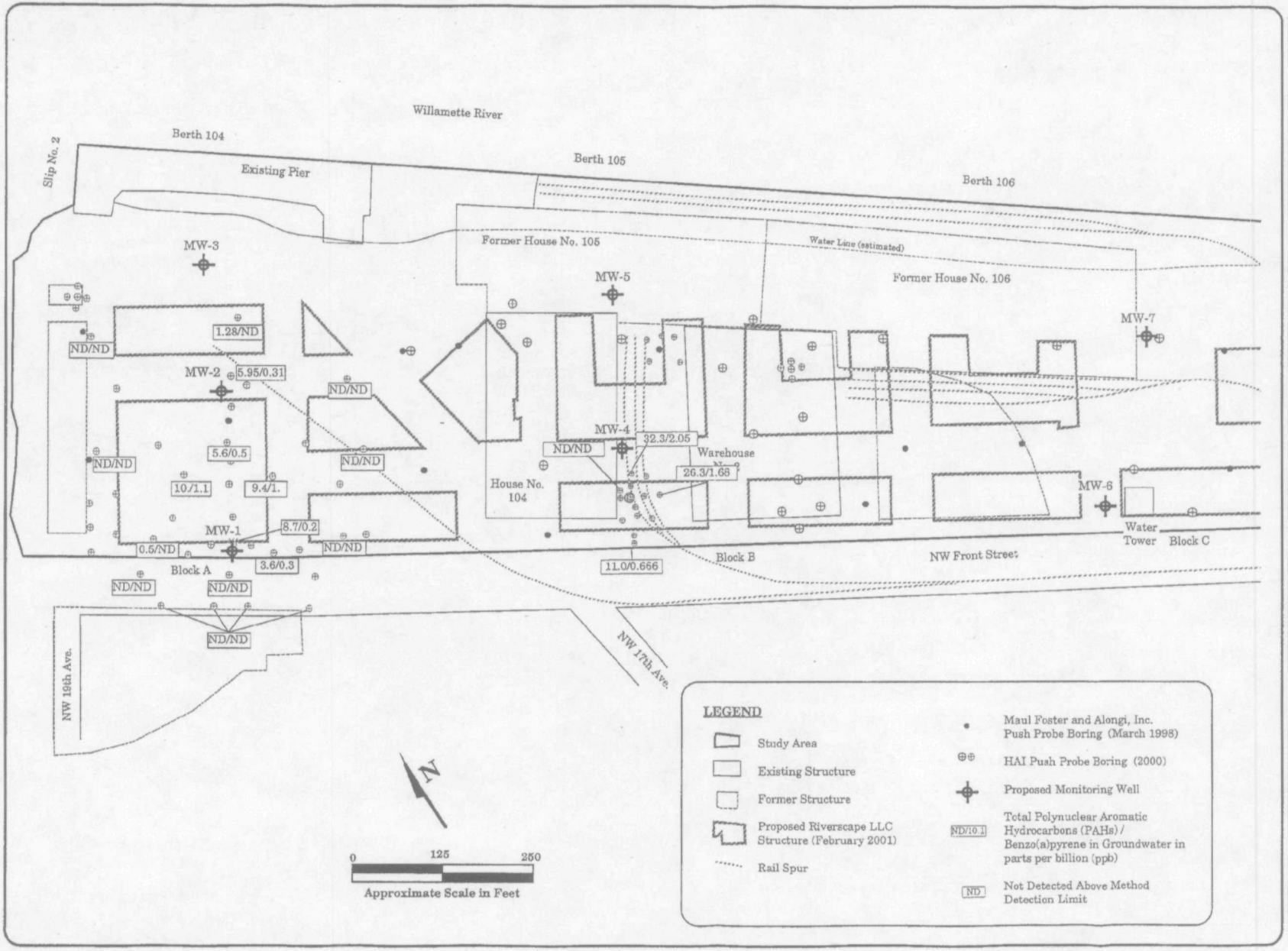


Figure 3

Proposed Monitoring Wells and PAHs in Groundwater

Work Plan Addendum No. 2
Marine Terminal 1 South
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HAHN AND ASSOCIATES, INC.
ENVIRONMENTAL MANAGEMENT
434 NW SIXTH AVENUE, SUITE 203
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HAI Project No. 5106

POPT1S604944

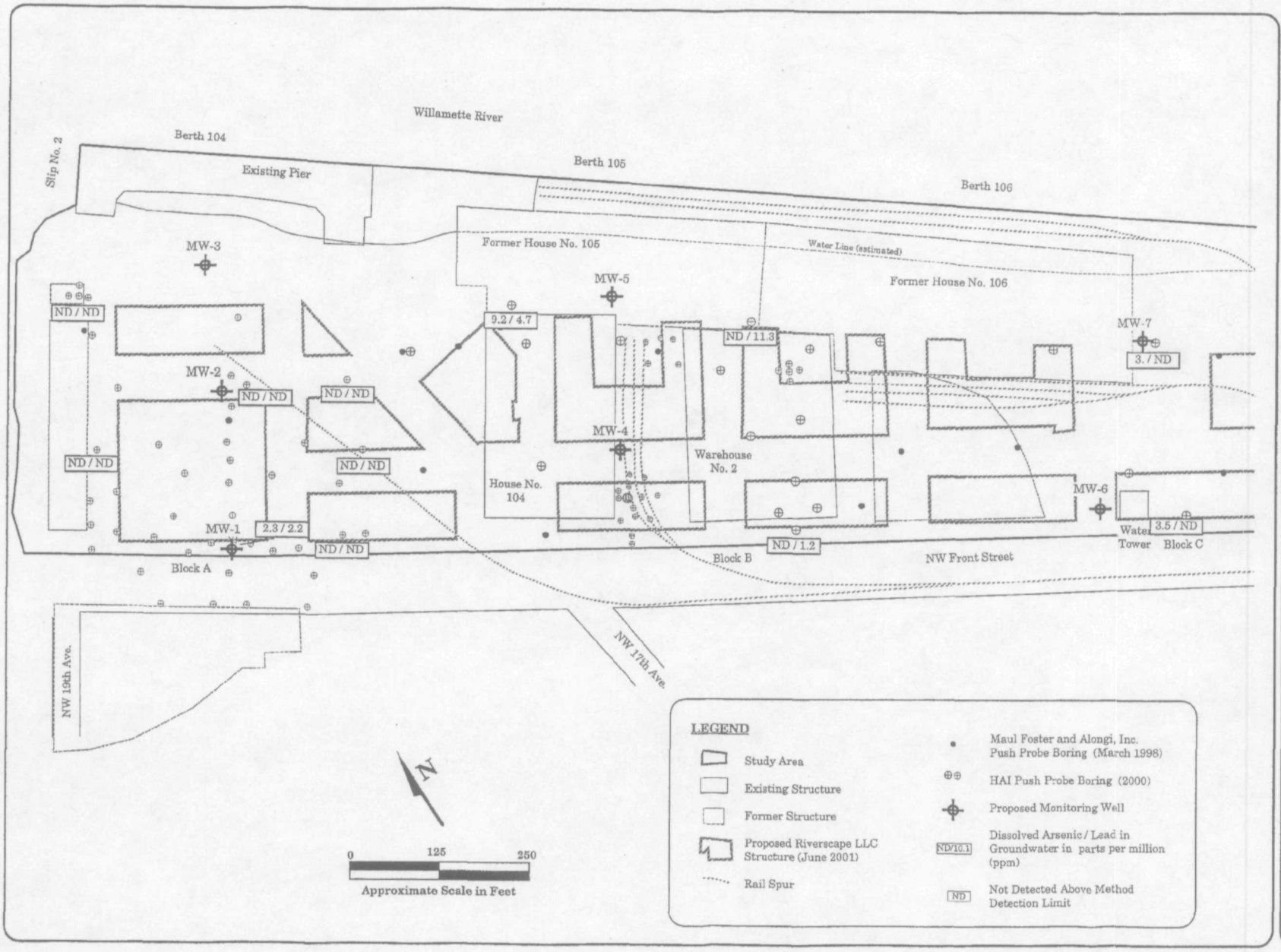

Figure 4

Proposed Monitoring Wells and Dissolved Lead and Arsenic in Groundwater

Work Plan Addendum No. 2
Marine Terminal 1 South
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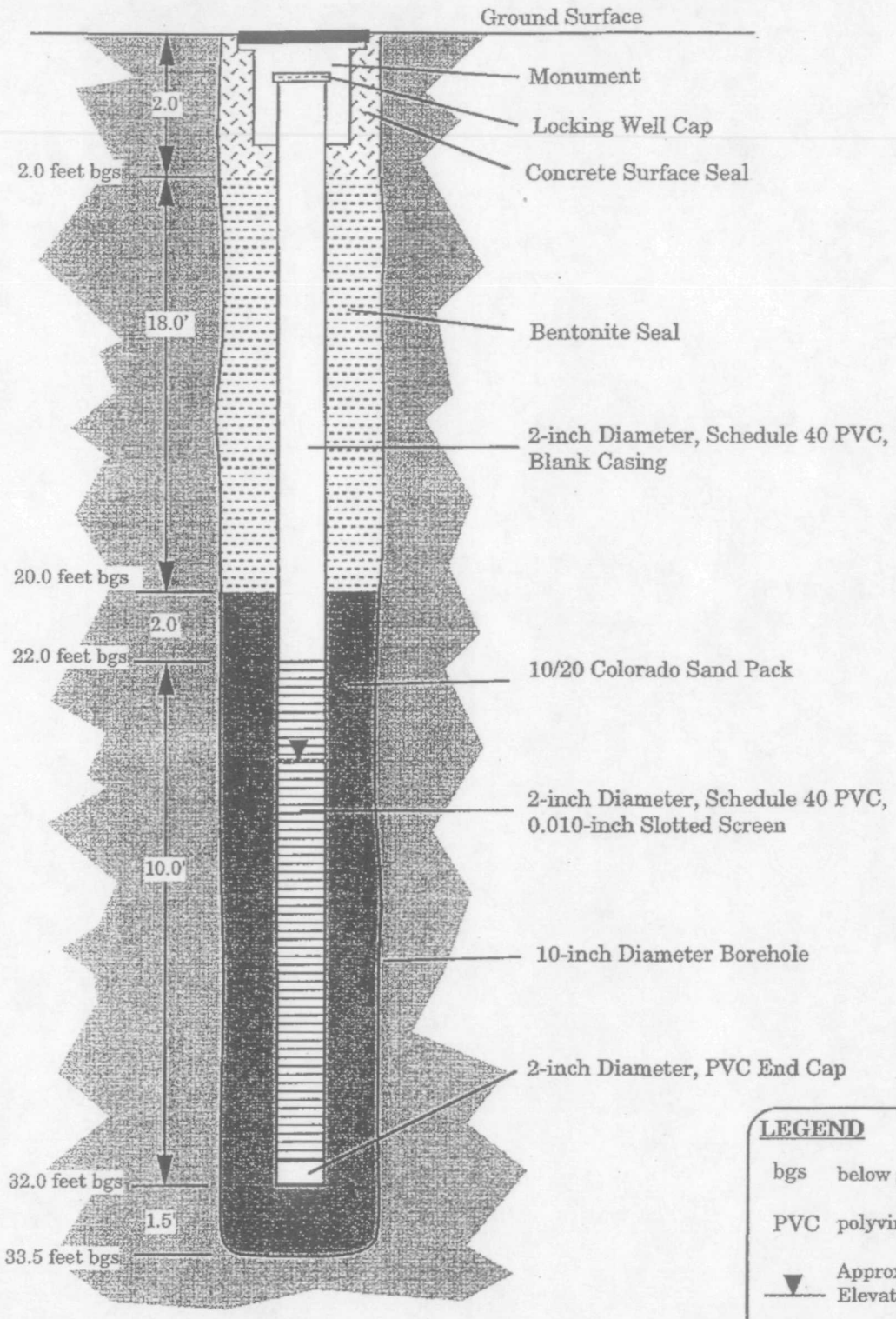

Project No. 5106 August 2001	**HAHN AND ASSOCIATES INCORPORATE** ENVIRONMENTAL MANAGEMENT 434 NW SIXTH AVENUE, SUITE 203 PORTLAND, OREGON 97209 (503) 796-0717	**Schematic Monitoring Well Construction** Work Plan Addendum No. 2 Marine Terminal 1 South 2100 NW Front Avenue Portland, Oregon	**FIGURE** **5**

POPT1S604946

APPENDIX A

Oregon Department of Environmental Quality Letter Dated

July 26, 2001

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
Northwest Region
2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471

July 26, 2001

Mr. Joe Mollusky
Port of Portland
Box 3529
Portland, OR 97208

Re: Comments
Remedial Investigation Report
Marine Terminal 1 South
Portland, Oregon
ESCI No. 2642

Dear Mr. Mollusky:

The Oregon Department of Environmental Quality (DEQ) has reviewed the "*Terminal 1 South Remedial Investigation Report*" for the Port of Portland Marine Terminal 1 South site. The report was prepared by Hahn and Associates, Inc. and is dated July 12, 2001. The report was submitted to DEQ on July 18, 2001. DEQ accepts this document as final and there is no need to revise it or resubmit it. DEQ anticipates most of our comments can be addressed in the site specific risk assessment and feasibility study. DEQ's comments are presented below.

General Comments

A. Section 4. Has a conceptual site model and evaluation of exposure pathways been conducted? It's not clear whether adequate data has been collected to evaluate each of the complete pathways (e.g., storm water).

Action: The revised RI report or Risk Assessment should present the conceptual site model and address each potentially complete exposure pathway.

B. Based on the documented impacts to groundwater, monitoring wells are needed to characterize site hydrogeologic conditions and to provide data of adequate quality for risk assessment purposes.

Action: A monitoring well network should be installed in key areas to validate the groundwater data collected from the direct push borings, monitor water quality variation over time, define groundwater flow directions at the site, and provide data to determine if a complete migration pathway to the Willamette River exists. A work plan should be submitted to DEQ that includes a description of the proposed monitoring well network and groundwater quality monitoring. Please provide DEQ with your schedule for submitting this work plan.

C. Boring logs for the direct push probes should be included in the RI report.

Action: Either drafted logs or copies of field logs should be included in an Appendix of the RI report. Please provide DEQ with an RI addendum that includes the field investigation logs and Oregon Water Resource Department Start Cards.

Specific Comments

1. Figure 1. Site boundaries should be added to this figure.

2. Section 6. Pages 14 and 15. The list of priority pollutant metals on these pages do not include arsenic or lead. Please correct as appropriate.

3. Section 7.3.2. The identification of contaminants of potential concern should be performed and documented in accordance with DEQ risk assessment guidance. The screening of COIs can be performed in the subsequent risk assessment.

4. Section 7.3.3.1. Page 22. B-38 Area. Please correct the RBSL reported as 0.0.062 to the correct number.

5. Section 7.3.4.2. Page 26. The current and future migration of contaminants away from the source areas (and potentially to the Willamette River) should be evaluated. For example, do the elevated PAH concentrations in boring B-77 groundwater indicate lateral migration towards the river from the B-38 area soil contamination zone? In addition, the distribution of groundwater contaminants around the B-37 drywell needs some further discussion. See General Comment B.

   In some cases, the method detection limit exceeds the Risk Based Screening Level. This uncertainty should be addressed in the Risk Assessment and considered in the monitoring well installation work plan.

6. Section 7.3.4.3. The presence of DEHP in site groundwater should be evaluated using data from groundwater monitoring wells. Data collected from on-site monitoring wells should be used to assess if DEHP is a contaminant of potential concern. See General Comment B.

7. Section 7.3.4 / 7.3.4.4. Analysis of metals in groundwater was done on filtered samples from push probe borings. While push probe data is useful for the initial characterization of site groundwater, monitoring wells are necessary to collect data of adequate quality to evaluate risk. See General Comment B.

   The last paragraph on page 27 state that all of the detected metals in groundwater at the site "are within the realm of background concentrations for an uppermost water-bearing zone for this area." Site groundwater background concentrations should be provided and their applicability demonstrated in the risk assessment.

8. Section 8.3. The statement that groundwater wells within 0.5 miles of the subject site "are likely no longer in use" is weak and should be followed up with more investigation into the current status of the wells.

9. Section 9. Since the risk assessment has not been completed at the site, it should be noted that the hot spot evaluation is preliminary.

10. Appendix E. Page E4. Section 1.6. The second paragraph indicates both field filtered and unfiltered groundwater samples were collected. Please verify and correct if necessary.

11. Tables. Please correct the tables for use in the risk assessment and feasibility study.

Table	Area	Boring	Comment
Table 2, Page 3	Dry Well Area	B-67/B-67a	Samples depths do not appear to correspond to Table 4
Table 2, Page 3	Dry Well Area	B-88	Should there be a 6.5 foot sample included?
Table 2, Page 4	B-38 Area	B-42	Were soil analyses performed on samples from this boring?
Table 2, Page 6	B-38 Area	B-50, B-51, B-77	Were soil analyses performed on samples from these borings?
Table 2, Page 6	B-38 Area	B-72	Should there be a 12.5 foot sample included?
Table 2, Page 6	B-38 Area	B-78	Should there be a 20 foot sample included?
Table 2, Page 7	B-38 Area	B-79	Were soil analyses performed on samples from this boring?
Table 2, Page 7	B-38 Area	B-81	Should there be a 20 foot sample included?
Table 2, Page 8	B-38 Area	B-107	Should there be a 4 foot sample included?
Table 4, Page 2	Dry Well Area	B-64, B-66, B-67	Vertical extent may not be defined – what is the depth to water in these borings?
Table 4, Page 3	Dry Well Area	B-87	Vertical extent may not be defined – what is the depth to water in this boring?
Table 4, Page 5	B-38 Area	B-68, B-70,	Vertical extent may not be defined – what is the depth to water in these borings?
Table 4, Page 8	Baseline Investigation	B-29	This boring does not appear to be included on Table 2
Table 7		all	Method detection limit of DEHP, mercury, and silver exceeds screening benchmark values.
Table 8		all	Method detection limits for some PAHs exceed screening benchmark values.

Please provide DEQ with your estimated schedule for submittal of the Monitoring Well Work Plan, Risk Assessment, and Feasibility Study at your earliest convenience. Please feel free to call me with any questions or concerns with the above comments at (503) 229-5562.

Sincerely,

Rodney G. Struck, R.G.
Project Manager
Voluntary Cleanup and Portland Harbor Section

cc: ESCI File No. 2642
Tom Gainer, DEQ/NWR
Eric Blischkie, DEQ/NWR
Jennifer Sutter, DEQ/NWR
Guy Tanz, Hahn and Associates, Inc.